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Official Stamp of Attendance Goes Here

Student Notes
Science on Saturday

Lawrence Livermore National Laboratory

March 17, 2007

Accelerator Mass Spectrometry: How AMS Works in Biology and Health Care

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Goal: Students will learn how scientists at Lawrence Livermore National Laboratory are using Accelerator Mass Spectrometry as a biological and biomedical measuring tool.

Questions: Listen carefully to the presentation to answer the questions during the talk. You will need these answers to get credit from your teacher.

1. What is an isotope?

2. What is AMS and how is it used?

3. How is C-14 produced in the atmosphere?

4. List two human tissues that do not "turn over."

5. What caused the bomb pulse?

6. How do we know that certain chemicals/foods are harmful our bodies?

7. What are mutations?

For more information about Science on Saturday go to:

http://education.llnl.gov

For more information on the center of atomic mass spectrometry:

http://cams.llnl.gov

Notes:

Science on Saturday Participant Survey

Accelerator Mass Spectrometry: How AMS Works in Biology and Heath Care

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Place a mark in the space that best describes you and *TURN IN THIS FORM AS YOU EXIT.*

I am a: Student ( ) Teacher ( ) Parent ( ) Other ( )

If a student, which grade do you attend? K-5 ___ 6-8 ___ 9-12 ___ College ___

If a teacher, which grade do you teach? K-5 ___ 6-8 ___ 9-12 ___ College ___

If you are a student, do you expect to earn extra credit in your science class? Yes ( ) No ( )

How many miles did you travel to come to Science on Saturday today?

0- 5 ( ) 6-10 ( ) 11-20 ( ) 21-30 ( ) 31 to 40 ( ) More than 40 ( )

Was the talk worth your time to attend? Yes ( )No ( )

How many SOS presentations have you attended before today (including previous years)?

0 ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 or more ( )

How did you hear about this SOS presentation? Teacher ( ) Newspaper ( ) Email ( ) Other ( ) _____

Write the number from the list below that best describes your knowledge of the following questions before and after this talk.

Did not understand.	(1)
Had some understanding.	(2)
I understand.	(3)
I understand, and could explain it to someone else.	(4)

Question	Before Talk	After Talk
What is an isotope?		
What is accelerator mass spectrometry?		
How does AMS work?		
How is AMS used in science?		

California Science Standards addressed in this session:

8th Grade - Structure of Matter

3. Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept:

    a. *Students know* the structure of the atom and know it is composed of protons, neutrons, and electrons.

    b. *Students know* how to use the periodic table to identify elements in simple compounds.

8th Grade - Chemistry of Living Systems (Life Sciences)

6. Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept:

    a. *Students know* that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms.

    b. *Students know* that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.

    c. *Students know* that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA.

9-12 Physics - Conservation of Energy and Momentum

2. The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects. As a basis for understanding this concept:

    f. *Students know* an unbalanced force on an object produces a change in its momentum.

9-12 Physices - Electric and Magnetic Phenomena

5. Electric and magnetic phenomena are related and have many practical applications. As a basis for understanding this concept:

    c. *Students know* charged particles are sources of electric fields and are subject to the forces of the electric fields from other charges.

    d. * *Students know* electric and magnetic fields contain energy and act as vector force fields.

9-12 Chemistry - Atomic and Molecular Structure

1. The periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure. As a basis for understanding this concept:

    a. *Students know* how to relate the position of an element in the periodic table to its atomic number and atomic mass.

9-12 Chemistry - Nuclear Processes

11. Nuclear processes are those in which an atomic nucleus changes, including radioactive decay of naturally occurring and human-made isotopes, nuclear fission, and nuclear fusion. As a basis for understanding this concept:

    c. *Students know* some naturally occurring isotopes of elements are radioactive, as are isotopes formed in nuclear reactions.

    d. *Students know* the three most common forms of radioactive decay (alpha, beta, and gamma) and know how the nucleus changes in each type of decay.

Speaker Bios

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